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ACRST-1998

OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: Nuclear Regulatory Commission
Advisory Committee on Reactor Safeguards

Title: 406th ACRS Meeting

Docket No.

LOCATION: Bethesda Maryland

DATE: Friday, February 11, 1994

PAGES: 156 - 225

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UNITED STATES NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

DATE: February 11, 1994

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UNITED STATES OF AMERICA

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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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406th ACRS MEETING

- - -

Nuclear Regulatory Commission

Conference Room P-110

7920 Norfolk Avenue

Bethesda, Maryland

- - -

Friday, February 11, 1994

- - -

8:30 o'clock a.m.

- - -

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1 PARTICIPANTS:

2 E. WILKINS, Chairman of the ACRS
3 T. KRESS, Vice-Chairman of the ACRS
4 C. WYLIE, Member of the ACRS
5 H. LEWIS, Member of the ACRS
6 C. MICHELSON, Member of the ACRS
7 I. CATTON, Member of the ACRS
8 J. CARROLL, Member of the ACRS
9 W. LINDBLAD, Member of the ACRS
10 P. DAVIS, Member of the ACRS
11 R. SEALE, Member of the ACRS
12 W. SHACK, Member of the ACRS
13 R. SAVIO, Designated Federal Official
14 S. HUCIK, GE
15 J. QUIRK, GE
16 A. BEARD, GE

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P R O C E E D I N G S

[8:30 a.m.]

1
2
3 MR. WILKINS: The meeting will now come to order.
4 This is the second day of the 406th meeting of the Advisory
5 Committee on Reactor Safeguards. During today's meeting,
6 the committee will discuss and/or hear reports on the
7 following: management perspective regarding ABWR review,
8 the advanced boiling water reactor design, form and content
9 of the proposed ACRS report on ABWR, annual ACRS report to
10 Congress and preparation of ACRS reports.

11 This meeting is being conducted in accordance with
12 the provisions of the Federal Advisory Committee Act.

13 Mr. Richard Savio is the designated federal
14 official for the initial portion of the meeting.

15 We have received no written statements or requests
16 for time to make oral statements from members of the public
17 regarding today's sessions. A transcript of portions of the
18 meeting is being kept and it is requested that each speaker
19 use one of the microphones, identify himself or herself and
20 speak with sufficient clarity and volume so that he or she
21 can be readily heard.

22 I will begin with some items of current interest.
23 I think the most interesting thing is that our first speaker
24 is not here yet. The first segment was supposed to be a
25 presentation or remarks by Dr. Thomas Murley, Director of

1 the Office of Nuclear Reactor Regulation followed by a
2 presentation by senior officials of the General Electric
3 Nuclear Energy.

4 GENE is here and Dr. Murley for reasons that are
5 apparent to all of us is not yet here so by agreement with
6 the subcommittee chairman, Carl Michelson, and the GE
7 people, they will go ahead and make their presentation and
8 if Murley shows up, well, fine, we will hear from him, too
9 and if he doesn't, then we will have to do the best we can
10 without the benefit of his remarks.

11 With respect to when we are going to get away from
12 here this afternoon, we have some letters to finish. I
13 don't know whether we are going to have enough clerical
14 staff to turn versions around very fast. I gave some
15 thought to that this morning.

16 MR. SAVIO: We have two secretaries in.

17 MR. WILKINS: That may be enough because we don't
18 have that many letters to do so perhaps we can but that will
19 be the pacing element will be these letters. We had the
20 first reading of four of them yesterday. We adopted a
21 Larkinsgram in final form yesterday so the sooner we can get
22 started on these, the more rapidly we will be able to
23 finish.

24 Whether we can finish in time to get you out to
25 Dulles by six o'clock is in my judgment questionable. I

1 don't know. I also don't know whether Dulles will be open
2 at six o'clock or if it is open whether planes to any
3 specific destination will be flying and whether you can get
4 to Dulles from Bethesda on the ice rink that will be called
5 the Beltway or whether even if you take the Metro out to
6 West Falls Church, whether you can then get from West Falls
7 Church to Dulles on the Washington Flyer Shuttle, I don't
8 know any of these things and I don't think that anybody at
9 8:30 this morning does know. So we will just have to play
10 that by ear and do the best we can.

11 Tanya was not here, is that correct?

12 MR. SAVIO: Tanya is not here. We can tell you
13 that BWI is at least temporarily closed which gives you some
14 idea of the condition of the airport and we can't get to the
15 airlines reservation offices other than getting recordings
16 that say, "please wait."

17 MR. LEWIS: One gets to them by simply putting it
18 on speakerphone and waiting. That is the only way. You
19 just do that.

20 MR. WILKINS: Are there any other general remarks
21 from the members?

22 MR. LEWIS: Yes. I wanted to warn you, Ernest,
23 that if Tom shows I would like to give him a sort of last of
24 last opportunity to make amends for his performance before
25 the Commission that long ago time that most people would

1 like to forget but I have trouble forgetting. I think if
2 you declare me out of order, that is your privilege.

3 MR. WILKINS: I am not sure I understand what
4 actions you propose to take.

5 MR. LEWIS: I would ask him to regret having said
6 what he did about our character. That is what I would like
7 him to do.

8 MR. WILKINS: You propose to ask him before he
9 makes any remarks?

10 MR. LEWIS: Before what?

11 MR. WILKINS: Before he makes any remarks?

12 MR. LEWIS: Yes.

13 MR. WILKINS: Or would you prefer to wait to see
14 if he is going to do it without your asking?

15 MR. LEWIS: I would like to ask him if he would
16 like to say anything to recoup from that problem.

17 MR. WILKINS: Hal, I don't know that that is
18 proper.

19 MR. LEWIS: I wanted to warn you.

20 MR. MICHELSON: It is not the agenda item under
21 discussion and we will end up with a half an hour or
22 superfluous dialogue.

23 MR. WILKINS: Jay has announced and I don't if you
24 continue to have the same attitude that you expressed last
25 month, but Jay has announced that unless Tom does, in fact,

1 do this then he doesn't wish to listen to anything he has to
2 say.

3 MR. LEWIS: I share that view and that is why I
4 want in a friendly way to give him an opportunity to recoup
5 his losses but as I say, you don't have to give me that
6 option. I wanted to warn you that that was my intent.

7 MR. WILKINS: I appreciate your warning. I will
8 advise you now that I regard that as out of order.

9 MR. LEWIS: Okay.

10 MR. WILKINS: Although I would also like to hear
11 him express some regrets. I don't think that I want to ask
12 him in advance to do so. Now if at the end he hasn't, then
13 I think a remark might be in order.

14 MR. MICHELSON: But not at the beginning?

15 MR. WILKINS: But not at the beginning, that is
16 all I am saying.

17 MR. LEWIS: In that case again I want to warn you
18 that without spitting fire, I will leave. I really do not
19 want to listen to Tom Murley until he retracts the comments
20 he made about the character of the Committee. That is a
21 warning.

22 MR. WILKINS: Those comments have been made. They
23 are on the record and the Chair will note them and the other
24 members will note them and the other members will, of
25 course, do what their conscience dictates as well.

1 MR. LEWIS: Proceed. I just didn't want to
2 surprise you.

3 MR. CARROLL: The difficulty with what you are
4 saying is that what Hal is proposing at least let's us know
5 if Tom is going to make those remarks. He may very well
6 decide to make them. He certainly has been warned that at
7 least the two of us are very unhappy with him.

8 MR. WILKINS: I don't know what you mean by "has
9 been warned." He is aware. Did he receive a specific
10 notice of anybody's intention to not listen to him?

11 MR. CARROLL: Yes, I think in the sense that Helen
12 reports back to him.

13 MR. WILKINS: I am sure she is aware of that, yes.

14 MR. CARROLL: In fact, I asked her to make sure
15 that Tom knew.

16 MR. WILKINS: In that case, your use of the word
17 "warn" is quite appropriate. Yes, if you asked her to make
18 sure that he knew this, then you certainly have warned him.

19

20 MR. LEWIS: I have no problem with that.

21 MR. WILKINS: Bill.

22 MR. LINDBLAD: The subject matter of Dr. Murley is
23 something that the Committee has to address very shortly in
24 terms of the ABWR review and given that the members will
25 have an opportunity to hear that, it would be a shame to

1 miss that since we are going to have to vote on a letter
2 shortly.

3 MR. WILKINS: I guess what Bill is saying is
4 something that I would like to second. Our committee has an
5 obligation to do the best job we can in reviewing the ABWR
6 design. Carl and his subcommittee have worked diligently
7 and furiously for a period of years actually on this subject
8 and I think it behooves this committee to listen to what the
9 Director of NRR has to say on the subject. So I am going to
10 listen to him.

11 MR. CATTON: They may not be here.

12 MR. WILKINS: If they don't get here, this is a
13 non-problem, a non-issue.

14 MR. CATTON: I called the operator at 492-7000 and
15 was told by the NRC operator that the NRC was closed.

16 MR. WILKINS: I am sure that is correct and I am
17 sure that, in fact, the federal government is closed.

18 MR. CATTON: That's right.

19 MR. WILKINS: That is what I heard on television.
20 Nevertheless, the ACRS --

21 MR. CATTON: Someone is raising their hand in the
22 back.

23 REPRESENTATIVE FROM DOE: We are open.

24 MR. CATTON: Are you federal government?

25 REPRESENTATIVE FROM DOE: Yes.

1 MR. MICHELSON: They are loyal employees like the
2 Post Office.

3 MR. WILKINS: I think we had better go ahead. We
4 all understand the situation here so let me turn the meeting
5 over to Carl.

6 MR. MICHELSON: Just a minute though, I think that
7 Tom is going to talk about a couple of other subjects if I
8 understand correctly.

9 MR. WILKINS: Yes. He is going to talk about the
10 ASP and SALP.

11 MR. MICHELSON: I would urge him to talk about
12 those last and not first. Can we tell him what order to
13 make his presentation?

14 MR. WILKINS: It is my understanding from what I
15 heard that that was the order; ABWR, ASP and SALP.

16 MR. MICHELSON: Good. I don't want to muck up the
17 ABWR with these other issues he is going to bring up because
18 I think that will also stir the pot a little bit.

19 MR. SAVIO: We provided extra time so that he
20 could speak to them.

21 MR. MICHELSON: He will do it last?

22 MR. SAVIO: Yes, and we provided extra time so
23 that he could address them.

24 MR. MICHELSON: All right.

25 MR. WILKINS: Fine. Let me turn the meeting over

1 then to the subcommittee chairman, Carl Michelson, who will
2 introduce the GE people who are here.

3 MR. MICHELSON: Thank you, Mr. Chairman. Just so
4 that the members are aware of how we are going to go here,
5 GE does have a presentation and I don't think it is very
6 long but they want to make a final presentation on their
7 material.

8 After that if Murley shows up during that
9 presentation, he will have to wait until a negotiated
10 convenient break point. Otherwise, he will have to follow
11 it depending on how we are moving.

12 I do have for the committee later this morning a
13 proposed draft of a final report which we will hand around
14 the table and discuss a little bit because there are several
15 blanks yet in the report that other people, most of whom I
16 have talked to already, have agreed to fill in.

17 That is the plan for the entire morning and
18 depending on who shows up, this may be a long morning. But
19 at any rate, we will proceed on that basis and I will let
20 Steve Hucik introduce the people from GE that are here to
21 make this final presentation. Thank you.

22 MR. HUCIK: Good morning, gentlemen and pardon our
23 informality but we were going to trudge through the snow and
24 weren't quite sure but this is our casual dress from
25 California typically. I am sorry we couldn't bring out some

1 sunshine, we tried but didn't quite make it.

2 MR. SHACK: As long as the room doesn't start to
3 rattle.

4 [Laughter.]

5 MR. LEWIS: You are not an honest man. It was
6 raining in California.

7 MR. HUCIK: I know. When we left it was
8 intermittent sun and rain so we tried. I would like to
9 introduce who I am sure you know well, Mr. Joe Quirk who is
10 the project manager on the ABWR certification effort for
11 General Electric and Mr. Alan Beard who represents our
12 Washington office here in Washington and he brought his
13 four-wheel drive truck here today to get us here on time so
14 that we could talk with you this morning.

15 [SLIDE.]

16 MR. HUCIK: Today we would like to spend a few
17 minutes with you and we appreciate the opportunity to maybe
18 give a final presentation on the ABWR and the features and
19 the success, I think, we have had through a number of years
20 of work with you and the staff. Today I would like to talk
21 a little bit about where we have been where we are headed.

22 [SLIDE.]

23 MR. HUCIK: I want to spend a few minutes talking
24 about the features. I think it is good at this point in
25 time when we have spent a long, long time under review to

1 stand back from all of the details and possibly provide you
2 with a GE perspective on just what we all have achieved
3 especially in terms of the overall improvements in the
4 design of the safety features and I think I would like to
5 take a few minutes to run through with you on that. I think
6 it would be helpful.

7 I thought also I would summarize our certification
8 activities and show you our current status and a little
9 summary of what is left to do.

10 Maybe I should give you a little background on
11 myself. My name again is Steve Hucik. I have been with GE
12 for over 20 years. I actually have been involved in the
13 ABWR program for over 12 years. I am the oldest youngest
14 looking person to be the consistent person on the ABWR from
15 its early inception back in the 1978/1979/1980 timeframe.
16 So I have been on this a long time.

17 My present assignment is that I am now manager of
18 all ABWR projects for General Electric Company in San Jose.
19 That represents the design certification effort that we are
20 here today for and it also represents the first-of-a-kind
21 engineering project that the ABWR is involved in.

22 I am also manager of the K-6/7, the two plants
23 that are being constructed in Japan and also several other
24 projects that we are pursuing in Japan and elsewhere.

25 My past association has been that I have been the

1 project manager of the K-6/7 job in Japan for the last five
2 or six years. So that is my background in terms of my
3 latest involvement in the ABWR.

4 I would like to point out that in Japan the first
5 unit, K-6, is about 54-percent complete as of the end of
6 January. The second unit is about 25-percent complete at
7 the same time and I would like to state that those projects
8 are currently on schedule and are planned to meet their 51-
9 month construction schedule and we are quite proud of that
10 accomplishment right now as well.

11 It has been a very long haul since the ABWR
12 application was submitted in September of 1987. Both the
13 staff, the ACRS subcommittees and committee have worked very
14 hard and at this point in time, I think we are in the home
15 stretch for the FDA which we expect to receive in May and we
16 would like to go over with you today some of the items that
17 we have accomplished and reach a conclusion.

18 GE's intent in sticking it through this long
19 process which has been difficult at times but informative,
20 we intend to have a fully licensed, standardized, proven
21 commercially competitive ABWR ready to compete in the very
22 competitive electrical generation market of the late 1990's
23 and the next century. This is our commitment and our goal.

24 GE has been working closely with the industry, the
25 NRC, you here at the ACRS as evidenced by the many meetings

1 we have had together and we will talk about that a little
2 bit later to resolve many of the last of the design
3 certification issues and process issues so that the path is
4 clear for us together to proceed to the final design
5 certification.

6 [SLIDE.]

7 MR. HUCIK: With that, I would like to spend just
8 a few minutes if you will talking about some of the safety
9 improvements that we have achieved and which you have
10 reviewed quite diligently I might say and helped us along
11 the way.

12 I think one of the key safety improvements that we
13 have made on the APWR is the addition of the reactor
14 internal pumps or as we affectionately call them, "the
15 RIPs." This is probably the most significant change. It
16 has eliminated all those large 28-inch diameter recirc pipes
17 in the dry well region and all the valves and large motors
18 and seals that are associated with those in the containment.

19 Since we have eliminated these large pipes that
20 are very in the vessel, we have been able to design the
21 vessel for a no core uncover for any design basis LOCA.
22 Therefore, we have basically no heat up.

23 Because we have eliminated these large pipes and
24 valves in the dry well, we have eliminated one of the
25 largest sources of radiation in the dry well region and also

1 eliminated the need for all the ISI and inspection
2 requirements during the operation and over the life of the
3 plant which has greatly reduced the operator exposure.

4 We have a very large reliability improvement in
5 these pumps. We have ten internal pumps located in the
6 bottom of the vessel and we have designed in sufficient
7 margins such that we can produce 100-percent power and 100-
8 percent flow even with one pump out of service so we have
9 significant margins for easing the operator's burden
10 basically during operation.

11 MR. WILKINS: Excuse me. Let me hear those
12 numbers again. There are ten pumps?

13 MR. HUCIK: We have ten internal pumps in the
14 bottom of the vessel.

15 MR. WILKINS: And you can get by with nine?

16 MR. HUCIK: You can get by full power/full flow
17 with nine.

18 MR. WILKINS: Thank you.

19 [SLIDE.]

20 MR. HUCIK: The next major improvement that we
21 have made are the fine motion control rod drives, the
22 "FMCRDs" as we call them. These are an adaptation of our
23 current hydraulic locking piston control rod drives.

24 They have essentially eliminated the scram
25 discharge volume which is contained in our current plants.

1 With that, we have eliminated half the containment plumbing
2 that was associated with that portion of the hydraulic
3 system.

4 The fine motion drives allow us to use two methods
5 to insert the drives which provides excellent diversity for
6 safety and operation and these include an electric motor
7 that can drive the rods into the reactor or a hydraulic
8 scram capability which we retain from our past designs.

9 Through a clever design of the housing in the
10 support of the FMCRD we have been able to eliminate all this
11 complex shoot out steel below the bottom of the vessel. It
12 allows for much easier maintenance, again, less exposure,
13 less time under the vessel and improves the overall function
14 of the reactor.

15 We have also through this design of the
16 elimination of this potential, we have eliminated the rod
17 drop, rod ejection accident through these design
18 improvements which also is again a significant concern that
19 we have alleviated in the overall design.

20 [SLIDE.]

21 MR. HUCIK: One of the areas that I am sure all of
22 you are most interested in as part of your safety review, in
23 the ECCS area, the emergency core cooling area, we have
24 added additional redundancy and significantly simplified the
25 systems.

1 We have three completely separate mechanical and
2 electrical divisions which provide a very high degree of
3 redundancy. Due to the fact that we do not uncover the
4 core, we have been able to reduce the amount of piping and
5 valves in terms of sizes of the ECCS systems in that.

6 The design because of this separation and
7 redundancy allows for an N-2 criteria to be applied for all
8 transients for the ABWR and essentially an N-2 for even the
9 accidents which basically allows our plant to operate with
10 one system out of service and yet still handle a single
11 failure and still meet all requirements.

12 This helps to relax some of our technical
13 specification limits or would allow for that and reduces the
14 burden on our operators and this is a significant
15 improvement. We have simplified the number of nodes and
16 modes of operation of the system.

17 For example, in the previous designs the RHR
18 system, the operators had to switch between containment
19 cooling and core cooling. This design allows for the heat
20 exchangers to be in the loop continuously. The operator
21 does not have to switch modes and you effectively have the
22 containment cooling always on duty again reducing the
23 operator burden and concerns during any sort of situation.

24 We have eliminated the core spray spargers again
25 because of the lack of core uncovering. This has eliminated a

1 complex piece of hardware. We have converted them basically
2 to core flooders which are much easier to design and
3 implement.

4 We have separated the RCIC, the reactor core
5 isolation cooling and the high pressure flooder initiation
6 levels. This allows us to respond to a much smaller break
7 that can be handled basically by our normal isolation
8 systems without having to challenge and activate the
9 emergency core cooling systems and this is a large
10 improvement that is helpful.

11 [SLIDE.]

12 MR. HUCIK: In the control and instrumentation
13 area, again we have made significant both technological and
14 advanced improvements in the control area. We have
15 implemented multiplexed fiber optics throughout the plant
16 including the turbine island. This has eliminated lots of
17 hard wiring and lots of cable pulling which is both
18 expensive and time consuming during the construction period
19 and allows for a shorter construction period.

20 The systems are digital solid state with a two out
21 of four voting logic. The control systems are triplicated,
22 self-testing. These allow for a board to be completely
23 removed from the system during operation and yet not get
24 into a scram situation.

25 There has been significant improvements in the

1 neutron monitoring system in a fixed wide range monitor for
2 the neutrons, period based scram protection. We have gone
3 to an automated rod block monitor which eliminates rod
4 withdrawal error and allows us to monitor the operational
5 limits much easier and continuously.

6 With the electric drives, the electric motors on
7 the fine motion control rod drives, this has allowed for
8 much easier automation principles. It has allowed us to
9 gang up to 26 rods during the start-up mode.

10 It allows for not only a faster start-up but also
11 allows for a much easier start-up in terms of the operator
12 actions necessary to bring the plant up. This can be
13 automated fully and allows for much smoother start-up and
14 again, less operator burden.

15 We have spent much time in the man/machine
16 interface area. Significant improvements in this area
17 include quite a bit of time spent over the last I would say
18 ten years looking at the layout and arrangement of the
19 control room and the panels.

20 We have reviewed the studies of the TMI area to
21 understand the operator actions and concerns. We have
22 engineered into the operator panels and the operator
23 procedures basically the symptom-based emergency procedure
24 guidelines such that it is much easier to operate this plant
25 given the control room configuration.

1 We have included very large flat panel displays at
2 the back of the control room to give all the operators and
3 the supervisors and other people who may be in the control
4 room an opportunity to understand exactly the condition of
5 the plant and the key parameters within the plant at any
6 point in time.

7 [SLIDE.]

8 MR. HUCIK: In terms of additional safety features
9 especially related to the ATWS conditions, we have made
10 major improvements actually in spite of the diversity of the
11 rod insertion capability of both electric and hydraulic
12 scram capability.

13 We have accepted and converted the stand-by liquid
14 control system to an automated feature and automated all
15 operator actions including the internal pump run-back and
16 feedwater run-back operations again easing the operation or
17 the burden of the operator.

18 Station blackout, I mentioned that we have three
19 independent mechanical and electrical divisions. Therefore,
20 we have three independent diesel generators on this system
21 and from a severe accident standpoint, we have also added a
22 gas turbine generator as another alternate AC power source
23 which again adds a significant diversity for station
24 blackout capability.

25 MR. LEWIS: Which do you think is more reliable,

1 the diesel or the gas turbine?

2 MR. HUCIK: Since GE makes gas turbines, they are
3 very reliable.

4 [Laughter.]

5 MR. LEWIS: Yes, but which do you think is more
6 reliable?

7 MR. HUCIK: I think the history shows that the
8 diesels are fairly reliable. The fact that we do have
9 three, I think we can rely on the diesels. We plan to rely
10 on the diesels. We have added an additional amount of
11 diversity with the AC turbine.

12 MR. LEWIS: In other words, you don't play to
13 answer the question.

14 [Laughter.]

15 MR. HUCIK: I do not have the specific numbers to
16 be able to say exactly which is more reliable.

17 MR. LEWIS: What does your gut tell you?

18 MR. HUCIK: What does my gut tell me? I think the
19 diesels are probably more reliable.

20 MR. LEWIS: Why don't you have a fourth diesel?

21 MR. HUCIK: For the diversity feature of mainly
22 eliminating chance for common mode failure or any concern
23 related to that, we have a totally independent power source
24 and AC turbine provides that independence.

25 MR. LEWIS: But if you feel that the gas turbine,

1 your gut tells you and I know you don't have the numbers,
2 that the gas turbine is less reliable, you are trading
3 reliability for diversity. Have you made that connection to
4 make sure you are going the right way? You have
5 deliberately chosen what your gut tells you is a less
6 reliable source of electricity.

7 MR. HUCIK: Again, I am not sure what the PRA
8 studies have said relative to that diversity. Joe or Alan,
9 have you seen anything in that area?

10 MR. BEARD: For our station blackout analysis, we
11 assume a reliability of the diesels of 0.975 and a
12 reliability of the combustion turbine generator of 0.95. I
13 think the only reason we feel that we can only claim 0.95 on
14 the combustion turbine generator is that there just isn't a
15 bit historical database out there on rapid starting of
16 combustion turbine generators, rapid start/rapid load.

17 MR. LEWIS: So if we are to believe those numbers
18 and I notice you qualified it by saying that is your station
19 blackout analysis, not that that is the real reliability,
20 but suppose for a moment we are to believe those numbers,
21 then you have chosen to put in a generator that is twice as
22 unreliable as the diesel in order to deal with which common
23 mode failures?

24 MR. BEARD: I think you are postulating the
25 possible common mode failure on any diesel and if we replace

1 it, you could either have gone to another diesel or go with
2 a different type of mode of force.

3 MR. LEWIS: But it would have to be a highly
4 probable common cause failure to accept a factor of two
5 increase in unreliability, doesn't it?

6 MR. BEARD: I am not able to answer that.

7 MR. MICHELSON: What is the size of your gas
8 turbine, I mean, the generator on the gas turbine?

9 MR. HUCIK: I believe the AC turbine is a ten
10 megawatt, I believe, gas turbine.

11 MR. MICHELSON: Then your diesel generator is how
12 big?

13 MR. MICHELSON: I beg your pardon?

14 MR. MICHELSON: The diesel is how large, the
15 generator?

16 MR. HUCIK: The diesel is about --

17 MR. BEARD: The diesel generators are five
18 megawatt electrical and the combustion turbine generator is
19 nine megawatt electrical.

20 MR. MICHELSON: One of the reasons, Hal, they are
21 putting the combustion turbine on was for plant equipment
22 protection other than safety so that is why it is twice as
23 big. Really to do that job you would have to put two more
24 diesels out there if you want to get your plant protection.
25 It isn't just there for safety. The fact is it is not

1 safety qualified even.

2 MR. LEWIS: I am not following your argument. I
3 am point out to you that it is more than the fourth diesel,
4 it is a fourth and fifth diesel if you want to do what that
5 combustion turbine is doing.

6 MR. DAVIS: You could get one of that size.

7 MR. MICHELSON: That is pushing it a little bit.

8 MR. DAVIS: They are bigger than that.

9 MR. MICHELSON: There are some of them, yes.

10 MR. WILKINS: But then their reliability may drop.

11 MR. MICHELSON: Yes. That is one of the problems.

12 MR. LEWIS: So your feeling, Carl, is that the gas
13 turbine may be twice as unreliable as these diesels but
14 wouldn't be twice as unreliable as a full-size diesel?

15 MR. MICHELSON: No, no.

16 MR. LEWIS: Then I don't see quite what you are
17 saying.

18 MR. MICHELSON: I am just saying first of all, you
19 don't need the fourth. You don't need a gas turbine. It is
20 in there partly for plant protection, partly in there as
21 further answer to the station blackout problem and the size
22 has to be about twice as big as the normal plant diesel that
23 is in there because of all of these extra loads. To
24 accomplish that, you would have to put in a very large
25 diesel which might not be so reliable.

1 MR. HUCIK: And in the ABWR, we have three
2 independent diesels which is an improvement in itself.

3 MR. WILKINS: Of course, I don't really know much
4 about these matters but what is the matter with having two
5 five megawatt gas turbines each of which would have a higher
6 reliability?

7 MR. MICHELSON: Not necessarily.

8 MR. DAVIS: Not necessarily.

9 MR. LEWIS: That is the point I am making.

10 MR. WILKINS: Good point.

11 MR. LEWIS: The point I am making is that here is
12 a case in which they are actually willing to quote the fact
13 that they have assumed whether or not these reliability
14 numbers mean anything outside of a station blackout rule,
15 they are willing to quote that they used a lower reliability
16 in the analyses for the gas turbine so it is a case in point
17 in connection with the diversity letter we are going to be
18 talking about in which they have chosen an inferior system
19 in terms of reliability.

20 MR. QUIRK: May I interject a perspective that may
21 be helpful and I hope it is.

22 MR. LEWIS: You understand that I am using you as
23 the foil for a more general point.

24 MR. QUIRK: Yes, sir. The point that I wanted to
25 make was that when we began the licensing on ABWR we did not

1 have in the plant design the AC turbine, gas turbine. We
2 had three independent Class 1-E diesels and the full safety
3 response of the plant was performed by those three
4 divisions. That is still the case today.

5 The AC gas turbine we are talking about is
6 provided to power the plant investment protection loads,
7 loads that would be nice to have, they would make things
8 easier and give more options but aren't absolutely essential
9 to execute a safety function.

10 We did this because the utilities requirement
11 document identified this level of diversity as required for
12 the next generation plants in the U.S. So in response to
13 the utilities' wishes, the General Electric Company
14 acquiesced and designed in the plant this AC combustion
15 turbine.

16 MR. LEWIS: The diversity requirement was in which
17 document?

18 MR. QUIRK: The utility requirement document.

19 MR. LEWIS: The EPR??

20 MR. QUIRK: Yes.

21 MR. LEWIS: Has an explicit requirement for
22 diversity?

23 MR. QUIRK: Yes. Yes, it does.

24 MR. MICHELSON: For plant protection.

25 MR. QUIRK: For plant protection.

1 MR. MICHELSON: And not safety, a diversity for
2 plant protection.

3 MR. QUIRK: I did want to make the further point
4 of being that it was in the design now we do have a
5 capability to connect the AC powered source to any one of
6 the Class 1-E diesels

7 MR. LEWIS: I understand. The issue I am
8 addressing is why in the choice between diesel and gas
9 turbine you went gas turbine and you have told me it is the
10 EPRI Requirements Document.

11 MR. MICHELSON: It didn't require a gas turbine
12 though, did it? It requires a gas turbine and not a diesel?

13 MR. QUIRK: Yes.

14 MR. CARROLL: But we have been told by
15 Westinghouse that in looking at that situation for AP-600
16 they believe that a diesel is more reliable than a gas
17 turbine and they are going to, at least the last I heard,
18 use a diesel for the alternate AC power source.

19 MR. LEWIS: Picking this out and I apologize to
20 those guys that I am using as a foil here to make a point
21 and I think the point has been made.

22 MR. CARROLL: There is one other interesting
23 aspect of all of this. As Joe says, they have three trains
24 of 1-E diesel, okay, plus this alternate AC system.
25 Combustion on the other hand satisfies the utility

1 requirements document but they only have two trains and an
2 alternate AC.

3 MR. MICHELSON: It gets a little tougher.

4 MR. CARROLL: That is the point of the draft
5 letter I read yesterday, that we have to fish or cut bait on
6 how much credit the alternate AC which is not a safety-
7 grade piece of equipment gets in the overall scheme of
8 things.

9 MR. MICHELSON: And with these three diesels on
10 the ABWR, you only need one of the three to do the job.

11 MR. LEWIS: Pardon?

12 MR. MICHELSON: You only need one of three
13 diesels.

14 MR. LEWIS: I understand.

15 MR. QUIRK: That is correct.

16 MR. MICHELSON: In Combustion's case, they need
17 one of two.

18 MR. LEWIS: I am not talking about the three. I
19 understand about the three. I am talking about the four.

20 MR. CARROLL: My perspective, I think what Joe
21 said is right. I think part of it is EPRI sort of caved in
22 to the staff, this is the path of least resistance to meet
23 the station blackout rule and I think they sort of said,
24 "Well, okay, let's do that and we will get some benefit out
25 of it, also."

1 MR. MICHELSON: It is called plant protection.

2 MR. CARROLL: From an investment protection point
3 of view.

4 MR. LEWIS: They recognized what we called the
5 "staff's unnatural devotion to diversity."

6 MR. DAVIS: I can't help but interject something.

7 MR. LEWIS: Don't help it.

8 MR. DAVIS: And I apologize to GE for taking up
9 some of their time but in my mind and I think I can find
10 many data analysts who will agree with me, if you fail three
11 diesels from the same cause, then the probability that the
12 fourth diesel will fail from the same cause is a lot higher
13 than the random failure probability of the combustion gas
14 turbine.

15 MR. LEWIS: Is there anyone who disagrees with
16 that statement?

17 MR. DAVIS: I don't know.

18 MR. LEWIS: I don't know either.

19 MR. DAVIS: So I am convinced that the combustion
20 gas turbine is certainly a better way to go or a diverse
21 supply is certainly better after you go with the three
22 identical units.

23 MR. LEWIS: The response, Pete, is that what you
24 quoted was a conditional probability. If the first three
25 go, the probability of the fourth from a common cause

1 failure, then clearly there is a common cause failure that
2 you haven't foreseen that is as likely as not to take out
3 the fourth and I think that is a reasonable inference.

4 But the probability that the three go is extremely
5 small. Therefore, there is a point at which you have to cut
6 bait on hypothesizing common cause failure. Do you do it at
7 four? If you have four and they go for a common cause, then
8 the probability that the fifth will go from the same cause
9 is also large. Two to three is the same point

10 But the way this is schematized by the data
11 analysts you are talking about is through the lambda to P/Q
12 factor, whatever it is called, and that is an artificial way
13 of describing the phenomenon you have just described;
14 namely, that if there is something you don't know and it
15 shows up in two, you know, if you see an epidemic of measles
16 in town and you pick a random kid who is very likely to have
17 measles. That is the sort of thing you are talking about.

18 But we are trying to deal with real probabilities
19 here and if you get away from these very, very low
20 probability events, you know, what is the probability that
21 there will be a common mode failure that will take out all
22 three diesels. If it is substantial, then the particular
23 design should not be approved.

24 MR. MICHELSON: Well, it may be the person
25 adjusting the diesel and not the diesels at all that causes

1 the problem and that isn't done very well in the PRAs as to
2 what the common cause factor from human error is, the man
3 who does the adjusting on the governors of all three diesels
4 or four diesels as the case may be.

5 MR. DAVIS: The other thing I was going to say is
6 I have looked at gas turbine generator data and, in fact, we
7 have some plants with those already that have been in
8 operation for quite some time and my sense is that they are
9 about equivalent in terms of reliability.

10 MR. CATTON: They are certainly simpler
11 mechanically.

12 MR. DAVIS: Yes.

13 MR. MICHELSON: Yes.

14 MR. DAVIS: I see no reason why they shouldn't be
15 at least as good.

16 MR. HUCIK: And if one looks at the technology,
17 basically a lot of us take a lot of flights on airplanes
18 with gas turbines and the reliability better be fairly high.
19 We have long distances to fly. So the other side of the gut
20 reaction is that gas turbines in general are very reliable.
21 There are a lot of them flying around today.

22 MR. CARROLL: One of the big problems with
23 industrial gas turbines is the GEs and the others who peddle
24 them try to cut corners by giving them a high rating which
25 in effect means that the damn things are typically run at

1 take-off power in the aircraft analogy and they are very
2 high maintenance and they have a lot of things break on them
3 because I used to run a bunch of them and if you just back
4 them off 20 percent or so, you would get a hell of a lot
5 better reliability.

6 MR. LEWIS: One of the great surprises when gas
7 turbines first came into the commercial aviation business
8 which was with the Viscount, as I recall, it was a turbo
9 prop, everyone was astonished at how reliable they were.
10 There was no precedent for it in the history of piston
11 engines because they don't shake. You can run them up fast,
12 spool them up and go.

13 MR. CARROLL: Actually, you have not been able to
14 until just recently. They have had starting sequences where
15 you go to hold conditions and another hold condition and so
16 forth. It has just been very recent that because of a
17 Federal Power Commission ruling as I understand it on what
18 you can count as spinning reserve the vendors have come up
19 with clever ways to make them much quicker starting than
20 they have been historically.

21 MR. LINDBLAD: As I understand, Dr. Lewis started
22 this discussion not as a critique really on ABWR or even on
23 the reliability of engines versus gas turbines but on the
24 issue of the use of diversity to solve perceived common
25 cause failure measures.

1 MR. LEWIS: That is correct.

2 MR. LINDBLAD: We have apologized to GE because
3 obviously this is a committee discussion that has continued
4 over from yesterday.

5 MR. LEWIS: I have already apologized to them a
6 couple of times.

7 MR. LINDBLAD: I really believe that the issue has
8 to do with how we in the safety area understand common cause
9 failure and what we do about common cause failure rather
10 than diversity itself.

11 MR. LEWIS: True.

12 MR. LINDBLAD: And I think the focus ought to be
13 on understanding common cause failures and manipulation of
14 data for common cause failure.

15 MR. LEWIS: I believe that that is what it said in
16 the risk assessment review group report in 1978 and I have
17 no problem with the kind of conversation we have been having
18 around the table which has to do with the reliability of the
19 various options and how you put them all together. I am
20 making sort of a campaign against sloganeering on the
21 subject in favor of this kind of analysis.

22 MR. MICHELSON: Why don't we proceed then with
23 that.

24 MR. CARROLL: Let me just add one other point that
25 I think is relevant. When we were in France this fall at

1 the Quadripartite meeting I discussed this issue on the
2 European pressurized water reactor that the French and
3 Germans are designing and their approach interestingly
4 enough is four trains, four 50-percent trains, and diverse
5 emergency diesel generators. They would have two of one
6 vendor and two of another on the four trains. So there is
7 another possibility.

8 MR. LEWIS: Yes, I remember that. Now we can
9 proceed.

10 [SLIDE.]

11 MR. HUCIK: Thank you. Let me speak a few minutes
12 about severe accident features that have also been
13 incorporated into the AWWP. Even in spite of our very high
14 confidence in the safety of our design and the improvements
15 we have made in the basic core cooling systems and shutdown
16 features of the plant, we have added a few other features to
17 try to even reduce the possibility and mitigation features
18 for severe accidents.

19 We have provided this AC independent water
20 addition connection that goes well beyond requirements but
21 is relatively easy to implement and we have added this to
22 the design as a simple added feature.

23 We have included a lower drywell flooder. In
24 spite of the fact that our PRA assessment show a very low
25 value, as low as around ten to the minus seven, we have

1 arbitrarily designed in a lower drywell flooder system that
2 on temperature can release portions of the suppression pool
3 water into the lower drywell below the reactor and if the
4 core were to fall into this it could be cooled and any
5 debris would be cooled by this flooding in the lower
6 drywell.

7 We have also included a containment overpressure
8 protection capability to really allow us to prevent a
9 postulated catastrophic failure of the containment but
10 actually to vent and control the pressure relief and this
11 provides again added protection.

12 Even if we were to postulate a core melt in the
13 ABWR, we believe that there will be no off-site health
14 effects and that the doses will be limited to less than 25
15 rem at the site boundary which is a half mile calculated.

16 We believe these safety improvements all lead to a
17 design that is able to handle any design basis event for 72
18 hours without any operator action and I think we at GE are
19 very proud of our ABWR design.

20 I have been involved with it for a very, very long
21 time, from its inception and it is quite, I think,
22 satisfying to me as an engineer to actually see one of these
23 things built so I have gone from a paper study to actual
24 construction experience in Japan and we are very proud of
25 that accomplishment and of the major technological and

1 safety improvements that we have incorporated into our ABWR
2 design.

3 MR. MICHELSON: You might want to keep in mind
4 that AC independent water addition is a very old concept.
5 It is on Browns Ferry, for instance.

6 MR. HUCIK: Right.

7 MR. MICHELSON: So I wouldn't claim it as new. A
8 lot of these are new and innovative but that one is not.

9 MR. CARROLL: It was on Humboldt Bay.

10 MR. MICHELSON: Yes. A lot of people have
11 connected up fire pumps and so forth with divisions to use
12 that as a water source. It is a good idea.

13 MR. HUCIK: It is the reason why, I think, our
14 engineers and those of us in management accepted it so
15 easily because it is like you said, it is a simple addition
16 and it works. It just works.

17 [SLIDE.]

18 MR. HUCIK: The next couple of charts I have here
19 just want to demonstrate the major steps that we have taken
20 on this road to design certification. I think it is
21 important to sit back for a few minutes and I know it has
22 been a very long and tough road but I think it has been a
23 satisfying road and one where we have had a lot of exchanges
24 amongst the staff, amongst your people and your
25 subcommittees and we have gone through EPRI requirements and

1 licensing review bases, a series of submittals of our safety
2 analysis report, our SARs, through 1987 and 1989.

3 During the 1988-1989 timeframe we had discussions
4 with the staff where we expanded the certification efforts
5 from just the Nuclear Island to include both the Turbine
6 Island and Radwaste Facility.

7 We have gone through a series of questions from
8 the staff. I am not sure I know the number, maybe Joe or
9 Alan does, but I would imagine it is in the multiple
10 thousands, probably three to five thousand or more
11 questions. All have been answered.

12 We have gone through a total of, I believe, now it
13 is 33 amendments on the SAR.

14 MR. CARROLL: How many more are you planning by
15 the way?

16 [Laughter.]

17 MR. DAVIS: It is 34, isn't it?

18 MR. QUIRK: Yes.

19 MR. HUCIK: Towards the end I think it was either
20 the 32nd or 33rd amendment where we basically took all the
21 various amendments, dumped it into the hopper and provided
22 one re-do and re-formatted consistent SAR so that it all
23 reads as one continuous document and that I think was an
24 improvement.

25 MR. MICHELSON: It was 31.

1 MR. QUIRK: Yes. That was amendment 31 and it was
2 in July of 1993. Right now we are preparing amendment 34
3 which would be the final amendment to close out all the open
4 items and to respond to the independent review group comment
5 and ACRS.

6 [SLIDE.]

7 MR. HUCIK: Design Certification material has been
8 prepare, the tier one material. The staff has proceeded
9 with essentially five area safety evaluation reports ranging
10 from a preliminary through an advanced copy of their final
11 safety evaluation report and we are on track for a final
12 design approval in May of this year, a DCD submittal
13 essentially at the same time. We are now anxious to proceed
14 basically with the last process steps to proceed toward
15 design certification.

16 MR. MICHELSON: You may want to tell the committee
17 what DCD stands for in case some of them don't know.

18 MR. QUIRK: Design control document.

19 MR. HUCIK: Design control document.

20 MR. MICHELSON: Does everybody know what that
21 contains?

22 MR. WILKINS: If we have to pass a test on it I am
23 not sure I want to try that.

24 [Laughter.]

25 MR. WILKINS: We have been told certainly.

1 MR. MICHELSON: Why don't you tell them what is in
2 the DCD. We are not going to review it.

3 MR. QUIRK: In the rulemaking proceeding, the rule
4 will reference the Design Control Document and therefore, it
5 will be the primary reference document and the Design
6 Control Document will have basically two part to it, a tier
7 one part which is comprised of the certified design
8 description and ITAAC and interfaces and site parameters and
9 the tier two part which is basically the SSAR.

10 So the simple algorithm if you will that describes
11 what tier two is, it is roughly the SSAR minus proprietary
12 information minus PRA plus PRA report.

13 MR. MICHELSON: My concern though with the DCD is
14 exactly what it will contain in terms of what is coming from
15 the SSAR because you have been vacillating on whether it
16 includes the PRA and that sort of thing.

17 MR. QUIRK: Right.

18 MR. MICHELSON: I don't know if it is even settled
19 yet. Does it include the PRA or not?

20 MR. QUIRK: That, of course, is being discussed.
21 The answer is everyone, the staff included, believes that
22 there is so much information contained in PRA that really
23 doesn't belong in a SSAR if you will, that it does make
24 sense that while you delete all that information to put back
25 in the important insights and features that came out of the

1 PRA in a very crisp and concise way and contain this is an
2 abbreviated report.

3 MR. MICHELSON: But it does contain information
4 you don't find elsewhere in the SSAR and it is information
5 upon which you make a safety judgment and if you remove it
6 from the process then in my mind there is something that is
7 not quite right.

8 MR. CARROLL: We have the notion of a living PRA
9 through the life of the plant.

10 MR. MICHELSON: If that is a requirement and it is
11 not clear that that is a requirement.

12 MR. DAVIS: It is not clear.

13 MR. MICHELSON: If it is a requirement to have a
14 living PRA, I have no problem then in taking it out of the
15 SSAR if it has to live on and kept up to date but that also
16 is not settled.

17 MR. CARROLL: I guess that's right.

18 MR. MICHELSON: That is what I expect that Pete
19 will put in his little write-up as to where we are on this
20 whole business. I think it is an important part of the
21 committee's decision on which way we swing or would like to
22 recommend that the Commission swing.

23 MR. CARROLL: Is it GE's intent to go ahead with
24 actual certification rulemaking?

25 MR. HUCIK: Absolutely, yes.

1 MR. CARROLL: I am surprised. What is the
2 incentive?

3 MR. HUCIK: The incentive is that the FDA is the
4 technical design approval but the certification is the next
5 step that the utilities in this country must have to assure
6 the licensing certainty for the future. Without it, there
7 is still that uncertainty and they must have that to
8 guarantee they can go forward with that uncertainty aside.

9 MR. CARROLL: I would have expected you to wait
10 until you had a potential licensee.

11 MR. MICHELSON: It is going to be easier to get it
12 now than later.

13 MR. CARROLL: Probably.

14 MR. MICHELSON: Because if you have a potential
15 licensee, you have potential intervenors right away whereas
16 right now you have reduced that field somewhat because of
17 interest.

18 MR. CARROLL: Yes.

19 MR. HUCIK: This has been an extremely long tough
20 process and General Electric with the staff and with
21 yourselves have somewhat pioneered this process as we go
22 through it and now is not the time to stop and hold. It is
23 the time to thrust forward and get it finished and prove to
24 the world we can.

25 Everybody is watching. I have been involved with

1 the Japanese for a very long time and they are watching our
2 process very closely to see that it does go to completion
3 and this is an important step.

4 MR. CARROLL: Okay.

5 [SLIDE.]

6 MR. HUCIK: I think this next slide, I think your
7 comments lead right into this next slide. This has been a
8 very long and tough road and GE has fortunately or
9 unfortunately been the one to first go through it and it has
10 been a tough road for us.

11 But I think we, ourselves within GE, are quite
12 proud of the progress and the resolutions and what we all
13 have accomplished together. The ABWR design certification
14 and the ALWR requirements that the utilities have helped put
15 together have been well integrated. They have been
16 reviewed. The ABWR meets all those requirements.

17 The NRC review is essentially complete. Your
18 review is essentially complete. All major technical issues
19 including severe accidents which GE helped put in, you know,
20 on its own initiative to some degree have been resolved.

21 This first time process of the Part 52 issues have
22 all been resolved; level of detail, ITAACs, the inspections,
23 tests, analyses and acceptance criteria, environmental
24 considerations, rulemaking procedures.

25 Yes, it has been a difficult road but I think we

1 feel that we have reached a good conclusion and a process
2 that we can proceed on.

3 [SLIDE.]

4 MR. HUCIK: We have received the staff's advanced
5 copy of the FSER. Fourteen open items were identified. The
6 staff is currently reviewing four of those issues and the
7 remaining ten issues, GE has completed its responses back to
8 the NRC.

9 MR. MICHELSON: The staff now maybe will still
10 show up to explain to the committee what the remaining
11 issues are and so forth but if they don't show up this
12 morning and I realize you can't speak for them but you can
13 certainly tell us what these issues are, I guess. Would you
14 be prepared to do it later?

15 MR. HUCIK: I think we may have a few back-up
16 slides here that I think we can maybe use.

17 MR. MICHELSON: If the staff doesn't show up
18 before the end of the allotted time, then if you would I
19 think the committee would like to know what is left to be
20 resolved.

21 MR. HUCIK: I think between Joe and I we could try
22 and help you understand that, yes.

23 MR. MICHELSON: That would be helpful, yes.

24 MR. DAVIS: They are identified in the FSER.

25 MR. HUCIK: Right.

1 MR. MICHELSON: Oh, yes, but not everybody around
2 the table reads 20 volumes.

3 MR. CARROLL: Every word, Carl.

4 [Laughter.]

5 MR. HUCIK: I think between all of us here we
6 could give you a summary of that.

7 MR. MICHELSON: That would be appreciated. Thank
8 you. You can tell us though right now from your vantage
9 point is there anything that you think is still holding it
10 up in terms of these issues?

11 MR. HUCIK: I don't think so. I think one issue
12 that was a contentious issue was the water level redundancy
13 and we understand the staff is now coming around and
14 agreeing with your position and our position, I understand,
15 and that one is not settled. We are waiting for
16 confirmation on that. I think the remaining issues have all
17 been resolved appropriately and we don't see any show
18 stoppers. I see Joe shaking his head positively there.

19 MR. CARROLL: But he has been doing that for ten
20 years.

21 [Laughter.]

22 MR. SEALE: It is just his eyes rattling. Let me
23 make sure I understand. When you say that there are ten
24 issues that you have completed your response --

25 MR. HUCIK: Right.

1 MR. SEALE: Does that mean that the staff has
2 accepted that response?

3 MR. CARROLL: No.

4 MR. HUCIK: No.

5 MR. QUIRK: No, not officially anyway. We have
6 provided mark-ups and we have heard feedback on a lot of
7 them and they are considered by the staff to be resolved
8 although there is no official record of that and the ones
9 that we haven't heard back on, the reviews are favorable and
10 it is just a few iterations. There are no hard points that
11 we are diametrically opposed to besides the one that Steve
12 mentioned.

13 MR. SEALE: So hopefully there is nothing more
14 than maybe trimming the edges so-to-speak.

15 MR. QUIRK: That's right.

16 MR. MICHELSON: Now there are a number of
17 questions which the ABWR subcommittee has been raising from
18 time to time and many of those are now finished. Some of
19 them though, we are awaiting the arrival of amendment 34 to
20 see their completion. Assuming that they go along according
21 to the way that GE indicated it will go, I don't see any
22 problem there either.

23 MR. HUCIK: Thank you. I think we feel, the
24 people especially who have gone through this long road and
25 especially Mr. Quirk who has been project managing this job

1 for a long time feel that this is one of the most thoroughly
2 reviewed designs ever and I think I have seen some comments
3 from this group on the same comment that including the
4 NRC/ACRS internal GE review over the last say 15 years
5 almost, we have had extensive reviews with our partners in
6 Japan; Hitachi/Toshiba, TEPCO, probably one of the most
7 demanding utilities in the world has also had a very
8 extensive review of this design and MITI, itself, the safety
9 review committees within Japan have also undergone a
10 significant technical review of this design.

11 I think the U.S. utilities through its ALWR
12 requirements documents and the reviews we went through with
13 them also have provided a significant amount of review. I
14 mentioned earlier that the lead ABWR plant is more than 50-
15 percent complete in Japan.

16 The ABWR is also the lead evolutionary plant in
17 the first-of-a-kind engineering program which GE is working
18 on currently and we are right now at the threshold of the
19 FDA issuance and before we can get on with design
20 certification as was suggested earlier we need to finish and
21 get the FDA issued as soon as possible and we basically
22 request and look forward to a favorable recommendation from
23 this committee.

24 [SLIDE.]

25 MR. HUCIK: Maybe you don't want to see this but

1 as a reminder of some of the difficulty and yet the
2 successes we have had, Joe has provided me with a chart
3 basically of the number of ACRS full and subcommittee
4 meetings that have occurred over the many years of the
5 review of this design.

6 In fact, during the 1992-1993 timeframe when a lot
7 of the significant technical review was going on either you
8 or your subcommittees were averaging nearly, I guess, two
9 meetings per month as you can. So it is a significant
10 amount of time and effort and expertise that has been
11 involved in this review.

12 MR. MICHELSON: Did that chart include the EPRI
13 URD reviews as well in your numbers?

14 MR. QUIRK: No, it does not. These are by the way
15 meeting days.

16 MR. MICHELSON: But in many respects those URDs
17 were ABWR meetings.

18 MR. WILKINS: Also.

19 MR. MICHELSON: Also.

20 MR. WILKINS: I was going to ask what that meant.

21 MR. QUIRK: Meeting days, sometimes there is one
22 ACRS meeting but it goes for two or three days.

23 MR. WILKINS: Understood. There are also some
24 full committee meetings where we talk about ABWR for two
25 hours. Do you call that a quarter of a day?

1 MR. QUIRK: No. That is a meeting day.

2 MR. WILKINS: All right. That is what I wanted to
3 know.

4 MR. MICHELSON: They padded that one a little bit.

5 MR. LEWIS: To them, it is a day's work.

6 MR. WILKINS: We do a day's work in two hours.

7 MR. HUCIK: But again, it has been a long road.

8 MR. CARROLL: I would like to compare that with
9 what Dave Okrent did as subcommittee chairman on Diablo
10 Canyon. That histogram looks very similar.

11 MR. MICHELSON: It was that long a time, too?

12 MR. CARROLL: Yes.

13 MR. SEALE: At least.

14 MR. HUCIK: Anyway, GE thanks you for your efforts
15 in that regard.

16 MR. CARROLL: Sure!

17 [Laughter.]

18 MR. DAVIS: I have one question, Mr. Chairman, if
19 I may.

20 MR. MICHELSON: Yes.

21 MR. DAVIS: Some of us were surprised, I guess,
22 and a little bit concerned about all of the issues and
23 information that has been pushed off to the COL applicant.
24 I am wondering how you feel about that. Do you think that
25 has compromised the effectiveness of this whole process or

1 is it about what you expected or how do you come down on
2 that issue?

3 MR. QUIRK: May I address that, please.

4 MR. DAVIS: Sure.

5 MR. QUIRK: I think that is a bum wrap is what I
6 think. I understand the perception. I think many people
7 have that. The idea of the COL action item wasn't to put
8 off a part of the design that we were trying to certify to a
9 later date. That is not what a COL action item is.

10 A COL action item is what commitment have we
11 imposed on the part of the plant outside our scope that must
12 meet that requirement in order for our in-scope systems to
13 function more or less.

14 These are also areas where there is site specific
15 information. It is procedural information such as start-up
16 testing, QA programs and things like that, things that are
17 applicant dependent. So it was a listing if you will of
18 things that needed to be dealt with and confirmed in the out
19 of scope part that would be provided later.

20 I just wanted to underscore that a COL action item
21 is not an incomplete review within the design we are seeking
22 certification but rather an item must be provided to match.

23 MR. DAVIS: Thank you. That is helpful.

24 [SLIDE.]

25 MR. HUCIK: I think in summary I just want to wrap

1 up.

2 MR. MICHELSON: Before you go to the summary, let
3 me point out one thing for the benefit of the committee.
4 There is perhaps one safety improvement that I think is of
5 significant importance that you didn't talk about which
6 evolved from the entire review process and that is, I think
7 we found the ABWR reactor water clean-up system wanting. It
8 was a system similar to all the other plants in the country
9 throughout the evolution.

10 But we started looking at the safety of that
11 closely and I think that GE has fixed the problems. They
12 are significant fixes. They are not necessarily cheap fixes
13 either. But I think for the first time we are beginning to
14 truly address the safety of the ABWR system. I think that
15 is an improvement.

16 However, it is not one you necessarily, I realize,
17 you necessarily want to push too hard because the first
18 question everybody asks was, "Well, how about the plants out
19 there today? They don't have that improvement." Well, that
20 is another issue for another day.

21 The one thing that probably caught at least myself
22 a little bit by surprise and that is that it turns out that
23 you can't just isolate breaks fast enough to prevent the
24 pressurization of secondary containment throughout. It is
25 just not a practical thing to get a couple second isolation.

1 It could be done under the right circumstances, a much
2 different approach.

3 But it turns out that even if the valves close it
4 is too late and therefore, a third valve was added by GE in
5 the system to protect the reactor vessel from whatever was
6 going on outside of secondary containment to kind of assure
7 we don't keep bleeding out and releasing activity further
8 and so forth.

9 I think that was a significant improvement, a
10 badly needed improvement. They also moved around some
11 valves out in secondary containment to better instrument
12 what was happening so that we didn't have breaks in areas
13 where we really didn't have proper isolation capabilities.

14 So I think they made a lot of changes and of
15 course, they ended up having to environmentally qualify the
16 equipment because you really can't get the valves closed
17 fast enough. I think these are all significant improvements
18 and I think for the first time we are beginning to address
19 the difficulties of putting high energy systems of this
20 magnitude out into the areas where the ECCS are located.

21 I think they are to be commended. I think they
22 did a good job. They did a good analysis and finally begin
23 to understand the problem. I don't think they were just
24 reacting to our continuous questioning. I assume they were
25 reacting to their own best judgment of what they were

1 finding but I think it was significant improvements.

2 MR. HUCIK: Thank you. A good summary of that
3 long discussion and resolution. Finally in summary, I have
4 said this, I think, all the way through but I think it is
5 good to wrap up and again state that GE is very proud of its
6 ABWR design. It has come a long way. It is an advanced
7 design with a lot of safety improvements.

8 You mentioned another one. I could stand up here
9 for a day and get through half of them probably. I tried to
10 hit the highlights. We have committed a lot of resources
11 through this review process. As we all know, it is the most
12 extensive ever, I think, that has been undertaken. We are
13 about ready to get our FDA and we strongly want to push that
14 through.

15 There are a few remaining actions and although
16 there are only a few, there are always only a few. As Joe
17 knows, it has been always next year and we would like to
18 have your encouragement of the staff to try to complete
19 this. We request your favorable recommendation on the ABWR,
20 your ACRS letter, of course, as soon as possible.

21 We encourage the Commission to finalize their
22 review of the advanced copy comments on the SER and accept
23 all of the remaining issues as closed, issue the FSER and
24 issue the FDA and also proceed on early Commission action on
25 the Advanced Notice of Proposed Rulemaking process issues

1 that have come up and we have discussed and continue
2 maintaining the schedules for the rulemaking.

3 We have a significant amount of momentum going
4 right now. Back to your question, I think the momentum is
5 there. We have achieved a lot and we need to proceed to
6 final design certification. I appreciate your time this
7 morning to listen to me. My job has been easy. I haven't
8 been involved in all these discussions over the last seven
9 years. I get to come in and claim almost victory. Thank
10 you very much.

11 MR. MICHELSON: Thank you. Do you have questions?

12 MR. LINDBLAD: Carl, are we going to have another
13 meeting with these GE representatives at some time?

14 MR. MICHELSON: We have scheduled for March 9th an
15 opportunity for the staff to come in and tell us of their
16 analysis on amendments, mostly amendment 34, but they
17 haven't covered 33 yet really either and also we have not
18 seen amendment 34 so if we have questions for GE, we will
19 give them an advanced agenda of those things we would like
20 to ask more about.

21 Amendment 34 is pretty important because many of
22 the questions the subcommittee has asked have not yet shown
23 up in the amendments and this is the one. So we will have
24 to go through and see if they have adequately covered what
25 we have received already in written responses but haven't

1 seen it reflected in design changes.

2 I am sure there will always be a few that got
3 slipped through the crack and then a judgment as to whether
4 they are important enough. I would rather not itemize these
5 in a report simply because I think we can do it without
6 that.

7 MR. LINDBLAD: But if this is the last time we
8 might see some of their managers, I would like to say that I
9 think that General Electric was always well-represented by
10 very competent presentations and high quality presentations.

11 MR. MICHELSON: I think they did a very fine job.

12 MR. DAVIS: And responsive to our requests for
13 information.

14 MR. MICHELSON: I think the best thing they have
15 been doing is giving us good written replies to our
16 questions. That gives them a better opportunity to think
17 them through and us a better opportunity to meditate over
18 them.

19 MR. LINDBLAD: I don't think we would have had 57
20 days of ACRS meetings unless we were learning something.

21 MR. MICHELSON: I think we learned all the way. I
22 am pretty sure the staff learned all the way along. They
23 started out again with a skinny little group that was
24 reviewing ABWR and as soon as we started asking questions,
25 they realized they needed a few more people to see what was

1 going on and I guess Murley once said that it was 387 people
2 towards the end working on this thing. I can't believe that
3 it could be that many.

4 MR. CATTON: Carl, we got written answers for the
5 subcommittee meeting in Portland and some of these are
6 really extensive, pages.

7 MR. MICHELSON: Yes.

8 MR. CATTON: I don't know what the next step is
9 with these.

10 MR. MICHELSON: The next step is that you read
11 them.

12 MR. CATTON: I have done that.

13 MR. MICHELSON: And see if you have questions and
14 if you have a problem with them --

15 MR. CATTON: Should I contact GE directly?

16 MR. MICHELSON: For clarifications, yes. If it is
17 something you think the subcommittee should deal with, then
18 we do that on March 9th.

19 MR. CATTON: Tom's name is by the severe accident
20 for the write-up that you need. Probably what I ought to do
21 is, I have been writing out my comments on their responses.
22 For the most part although I have a little problem with how
23 the analysis is done I agree with the bottom line with just
24 a couple of exceptions. Seeing as how they have or it
25 sounds like they have put together some sort of a model of

1 the upper drywell, lower drywell, core and everything else,
2 it would be nice if they could just do a couple more
3 calculations and just put this thing to bed.

4 MR. MICHELSON: You mean they aren't quite there,
5 you are saying?

6 MR. CATTON: What should I do, Joe? Should I just
7 call Carol?

8 MR. QUIRK: That is acceptable. You could call me
9 if you can't get Carol and we would be happy to close with
10 you.

11 MR. CATTON: All right.

12 MR. QUIRK: I think that is the fastest way
13 actually.

14 MR. CATTON: It might be that I just don't
15 understand because as I read through these I get the feeling
16 that some of the questions that we raised were answered all
17 by itself and in some cases, these things compound
18 themselves like you don't treat radiation heat transfer by
19 itself.

20 There is also convection at the same time and I
21 can't tell from reading her response whether she just took
22 each thing and addressed it all by itself or took it as a
23 total and then looked at each of these pieces. Probably
24 what I ought to do is just her and talk to her.

25 MR. MICHELSON: One thing that we should keep in

1 mind, I think it is fine to call someone and just ask them
2 for clarification but if you think there is something that
3 we really need to at least have on the record, so-to-speak,
4 we should have Medhat in on the call just to keep the
5 continuity but if it is just a clarification, I think it is
6 fine for you to call.

7 MR. CATTON: In one case the analysis was wrong
8 but I don't know if it is important.

9 MR. MICHELSON: You can clarify that with her but
10 if you have something we really think they have to do some
11 more work on, then I think Medhat should be in on it so he
12 is aware because the staff finds out from Medhat what is
13 going on.

14 MR. CATTON: All right. Maybe what I ought to do
15 is give you my written responses on these and after you get
16 them to Joe or whoever, they can then contact me at UCLA.

17 MR. CARROLL: I don't think that is what he is
18 saying.

19 MR. MICHELSON: I didn't think it was necessary to
20 go to Medhat first. If you want clarifications just call.

21 MR. CATTON: Just call, all right.

22 MR. MICHELSON: If you have problems, then I think
23 it is important to do a little bit of documentation because
24 someday this thing in certification rulemaking might very
25 well come up and it is nice to have some record of what has

1 been going on.

2 MR. CATTON: In a way that is what I would really
3 like to do. These answers end up in the PDR, don't they?

4 MR. MICHELSON: They are going to end up
5 essentially in the PDR because they end up in our minutes.
6 We are citing the minutes in our final report and that is
7 where people go then to get the questions and answers.

8 MR. CATTON: The document that I am looking at was
9 sent to us by Dean Houston, the GE ABWR responses to the
10 severe accident meeting.

11 MR. EL-ZEFTAWY: This was the meeting in September
12 in Portland.

13 MR. CATTON: Yes.

14 MR. EL-ZEFTAWY: Right.

15 MR. MICHELSON: That particular one by the way
16 Medhat needs to be aware but Dean needs to handle it because
17 that is a different subject.

18 MR. CATTON: Okay.

19 MR. MICHELSON: I thought you were referring to an
20 ABWR subcommittee meeting so work with Dean on it.

21 MR. EL-ZEFTAWY: It was a severe accident
22 subcommittee meeting.

23 MR. CATTON: It was Tom's severe accident
24 subcommittee meeting but it was on ABWR.

25 MR. MICHELSON: But it is still severe accident.

1 MR. CATTON: Okay.

2 MR. EL-ZEFTAWY: But if you are having problems,
3 just let me know and I will try to handle it for you if you
4 want.

5 MR. MICHELSON: We want to leave a little trail of
6 breadcrumbs behind.

7 MR. CATTON: I don't think there are. I just
8 thought that for a couple of questions in here the answers
9 should be changed.

10 MR. HUCIK: I would encourage that you do have
11 some informal discussions with our people to try to clarify
12 it. In fact, maybe it is a simple clarification of an
13 answer or embellishment that it is done quickly and I would
14 encourage that interchange.

15 MR. CATTON: I would like to see it in the written
16 document because as you read through this, you may have
17 troubles with it in the future even if we decide that it is
18 okay.

19 MR. MICHELSON: The other thing, Ivan, if you do
20 do it informally which I don't object to and I don't think
21 anyone else will either, but if you come across something
22 you really think has to be done and it turns out it was the
23 informal call, then just give Dean a call and tell him what
24 you did.

25 MR. CATTON: I will communicate it to Tom.

1 MR. KRESS: Yes.

2 MR. WILKINS: I think it may be important though
3 to recognize the ACRS doesn't tell GE what to do.

4 MR. CATTON: I know that.

5 MR. WILKINS: So informal conversations, fine. If
6 it gets down to where you think it would be helpful to have
7 four or ten or one or a hundred additional calculations,
8 then I think we need to get more formal.

9 MR. MICHELSON: Yes.

10 MR. WILKINS: You need to get our staff in on the
11 act and perhaps also the NRC staff in on the act and give GE
12 a much more formal request. I hope that we don't run into
13 that and I am sure GE also hopes that we don't run into that
14 to any significant extent.

15 MR. MICHELSON: The other reason for formality in
16 this case is that this is going to become part of the
17 rulemaking process and I don't know what will come up that
18 might feed back to us.

19 MR. CATTON: I think that is why in a couple of
20 cases there needs to be another paragraph associated with
21 this to close it out.

22 MR. MICHELSON: I am sure they will provide it.

23 MR. CATTON: Well, that is up to them but I will
24 communicate it.

25 MR. MICHELSON: Any other questions?

1 [No response.]

2 MR. MICHELSON: At this point we could ask if GE
3 would be willing to talk about the outstanding issues, the
4 four and the ten. Since the staff has yet to show up, I
5 don't know, do we know if they are ever going to show up?

6 MR. SAVIO: There is no indication.

7 MR. MICHELSON: There is no indication. Then
8 maybe GE could at least tell us their side of how they view
9 the remaining issues just because those do have to get
10 closed out before this job is done.

11 MR. WILKINS: Carl, I would like however not to
12 spend the full hour and a half that has been assigned to
13 item 12 or at least the hour and a half minus the 15-minute
14 break.

15 MR. MICHELSON: Just keep going?

16 MR. WILKINS: Just keep going.

17 MR. MICHELSON: Sure and I don't think this will
18 take more than five or ten minutes. We don't have to do it
19 at all but I assume the staff is going to come down in March
20 now, I guess. I don't know if we will want to hear from
21 them by that time.

22 MR. EL-ZEFTAWY: We have the March 9th
23 subcommittee meeting and we can ask them then.

24 MR. MICHELSON: They will be here for that then,
25 good.

1 MR. WILKINS: I ought to ask you, Carl, whether
2 you think that this Act of Nature which has wiped us
3 partially out today will have a significant impact on our
4 overall schedule? We have made certain promises to the
5 Commission as to when we are going to finish.

6 MR. MICHELSON: I think it doesn't affect us at
7 all.

8 MR. WILKINS: Fine.

9 MR. MICHELSON: That is my view at least.

10 MR. WILKINS: Good.

11 MR. MICHELSON: The staff will just have to catch
12 up with us and they can do that at the subcommittee meeting.

13 MR. WILKINS: At the March meeting, I guess.

14 [SLIDE.]

15 MR. BEARD: Good morning. I am Alan Beard. I am
16 sure you all know me. As Joe indicated there are 14 open
17 items listed in the advanced SER copy. I would like to
18 start off by emphasizing we feel that we are on closure path
19 with all 14 of these.

20 MR. MICHELSON: Could we just ask you to kind of
21 stand back so that we could all see the slides.

22 MR. WILKINS: We don't have these.

23 MR. BEARD: Yes. These are back-up slides and we
24 do not have copies but we can get some to Med and provide to
25 you. The first item there is a request for withholding

1 under 10 CFR 2.790 which is proprietary information. The
2 staff is reviewing our request and we are in the process of
3 closing that out.

4 MR. MICHELSON: Which way do you think it is
5 going?

6 MR. BEARD: We are going to resolve it.

7 MR. MICHELSON: I know you are going to resolve
8 it. I am sure of that. But are you going to put in an
9 abbreviated version then into the SSAR of the proprietary
10 information?

11 MR. BEARD: Where it is necessary, we will do an
12 abbreviated version or if it is not troublesome, we will put
13 the proprietary information back in.

14 The second item is COL action items and that is
15 basically a staff action and they report that there are no
16 problems here.

17 Fuel burnup limit, the staff has requested that
18 there be a limit established that would constitute an
19 unreviewed safety question if an applicant were to try to go
20 beyond that. We have agreed to accept the staff's position
21 on that.

22 Suppression pool strainers.

23 MR. CARROLL: That is a so-called starred item?

24 MR. BEARD: Yes. That is one of those tier two
25 star items. The next item is suppression pool strainers.

1 As a result of the recent events in Barseback and at Perry
2 the staff feels that the reg guide that we are committed to
3 satisfying is potentially non-conservative. Therefore, they
4 have put a requirement or asking to impose an additional
5 requirement beyond that. Although we are not fully happy
6 about it, we have agreed to go ahead and to satisfy that
7 requirement.

8 Addition of non-Class 1E loads to Class 1E
9 systems, we have two non-1E loads that are on our 1E buses
10 right now. We did not want to make that tier one. They
11 feel it is tier one and we have agreed to make it that way.

12 [SLIDE.]

13 MR. BEARD: Equipment survivability, this is for
14 stuff beyond design basis obviously and after many, many
15 discussions with the staff we do have agreement on a closure
16 path and feel that we are going to wrap that up in the next
17 couple of days. They are reviewing our most recent
18 submittal and have indicated generally that there are no
19 problems with it.

20 Containment sump design, the staff is happy with
21 the design we have for protecting the sump from ingress
22 of corium. However, they wanted us to do some additional
23 work to check some research that is out there. We have
24 agreed to do that and have completed it and have submitted
25 it to staff and their indications are that there are no

1 problems there.

2 RIP impeller and shaft replacement and I apologize
3 for the non-legibility there, there was an issue that came
4 up what protection we had from inadvertent pulling the plugs
5 that prevent the draining the reactor vessel. We have
6 provided, well, I shouldn't say provided, we have explained
7 the design features that are in there to prevent that from
8 happening and they have indicated that is satisfactory.

9 CRD replacement, the issue came up again if you
10 inadvertently removed a control rod blade with the CRD
11 mechanism removed them without the housing blank flanged
12 what happened. We have provided the information. The staff
13 is discussing that item and that one also is on closure.

14 RPV water level instrumentation, this is the
15 diversity issue. Staff has indicated they are going to re-
16 write the SER section addressing this and to adopt the ACRS
17 and GE position that it is not a necessary item for this
18 design.

19 I know there are 14 and I can't find the other
20 slide. I have it here. This is one, comments from ACRS
21 meetings regarding fire and flooding treatment in the ITAAC,
22 the tier one. We have gone back and we are including some
23 items to expand that discussion and put requirements on it.
24 The staff has reviewed it and feels that it adequately
25 addresses the concern raised.

1 Inspection of QA programs, the staff did an audit
2 of our QA program out in San Jose. There were some open
3 items or concerns raised. GE has responded to those and we
4 are in the process of closing that.

5 Containment related EPGs, the primary issue there
6 is raising the heat capacity temperature limit curve. We
7 have provided additional analysis to the staff and the staff
8 has reviewed it and indicated that they find it acceptable.

9 Then another concern that ACRS had raised earlier
10 was the potential for corium to ingress into the access
11 tunnels leading to the lower drywell. We have gone back and
12 reviewed that issue and are including some features to
13 prevent it and the staff has reviewed it and indicates that
14 it should take care of the item.

15 Any questions?

16 MR. MICHELSON: Questions?

17 MR. CARROLL: I thought I was convinced in
18 Portland you couldn't get corium into the tubes.

19 MR. BEARD: I am not certain you can either.

20 MR. CARROLL: You made a good case for it and now
21 you are telling me you are going to put a fix in. Good.

22 MR. CATTON: They want to be doubly sure, Jay,
23 doubly.

24 MR. MICHELSON: Mr. Chairman, why don't I turn it
25 back to you and we can take a break and see if we can find

1 out if the staff is going to show up.

2 MR. WILKINS: It is a little early for our break
3 but I think this is the right time to go ahead and take it.

4 MR. CARROLL: What have you found out, Ivan, about
5 airplanes?

6 MR. WILKINS: Gentlemen, let Carl have the floor
7 for a minute while we are still on the record.

8 MR. MICHELSON: After the break I would like a
9 half an hour and it probably won't take that to discuss the
10 letter that we need to have which is the one on the form and
11 content of the ACRS report so that we can understand what is
12 left to do and who might be doing it and then that finishes
13 the ABWR portion.

14 MR. WILKINS: That item will be a matter of record
15 and after that I think we can start writing letters.

16 MR. MICHELSON: That item doesn't need to be a
17 matter of record. It is part of our final report.

18 MR. WILKINS: So it is.

19 MR. MICHELSON: So it doesn't need to be reported.
20 It is not closed or anything. It will be pre-decisional.

21 MR. WILKINS: Then as far as you are concerned
22 then, Carl, we can release this young lady now.

23 MR. MICHELSON: For the rest of the day, I guess.

24 MR. SEALE: Unless the staff shows up.

25 MR. MICHELSON: Let's wait and see if the staff

1 shows up.

2 MR. WILKINS: Let's wait and see if the staff does
3 show up. They are already 18 minutes late.

4 MR. CATTON: Eighteen minutes in this weather is
5 nothing.

6 MR. WILKINS: I quite agree. In fact if Tom
7 Murley were to show up now I would regard that as almost a
8 miracle. I started to say acceptable but I don't want to
9 get involved in that debate again.

10 MR. LEWIS: I am surprised though that if he is
11 not coming he hasn't called.

12 MR. MICHELSON: He should have called.

13 MR. WILKINS: Maybe he has.

14 MR. EL-ZEFTAWY: At the break I am going to go
15 check. Maybe it is in the voice mail somewhere.

16 MR. MICHELSON: Let's make real sure they are not
17 coming then because I would hate to have them come in and we
18 have no recorder anymore or anything.

19 MR. WILKINS: So why don't you stay around just
20 for a little while please.

21 MR. MICHELSON: I would like to thank GE for their
22 presentation this morning. I think we are finishing up now
23 and I believe we will be prepared to put out a report
24 shortly. Thank you.

25 MR. WILKINS: We will reconvene at 10:20.

1 [Brief Recess.]

2 MR. WILKINS: We will conclude now the reported
3 portion of today's meeting and thank you very much.

4 [Whereupon, the reported portion of the 406th ACRS
5 meeting was concluded at 10:23 a.m.]

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REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

NAME OF PROCEEDING: 406th ACRS Meeting

DOCKET NUMBER:

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were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Marilyn Estep

Official Reporter
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